

regarded as surprising.

The first cationic polymer is a copolymer of cationic and nonionic monomers; in contrast, the second cationic polymer can be both a copolymer and a homopolymer.

Examples of suitable cationic monomer components are cationized esters of (meth)acrylic acid, such as dimethylaminoethyl (meth)acrylate, diethylaminoethyl (meth)acrylate, diethylaminopropyl (meth)acrylate, dimethylaminopropyl (meth)acrylate, dimethylaminobutyl (meth)acrylate, diethylaminobutyl (meth)acrylate, cationized amides of (meth)acrylic acid, such as dimethylaminoethyl (meth)acrylamide, diethylaminoethyl (meth)acrylamide, diethylaminopropyl (meth)acrylamide, dimethylaminopropyl (meth)acrylamide, dimethylaminobutyl (meth)acrylamide, diethylaminobutyl (meth)acrylamide, cationized N-alkylmonoamides and diamides with alkyl groups containing 1 to 6 C atoms, such as N-methyl(meth)acrylamide, N,N-dimethylacrylamide, N-ethyl(meth)acrylamide, N-propyl(meth)acrylamide, tert-butyl(meth)acrylamide, cationized N-vinylimidazoles as well as substituted N-vinylimidazoles, such as N-vinyl-2-methylimidazole, N-vinyl-4-methylimidazole, N-vinyl-5-methylimidazole, N-vinyl-2-ethylimidazole and cationized N-vinylimidazolines, such as vinylimidazoline, N-vinyl-2-methylimidazoline and N-vinyl-2-ethylimidazoline.

The basic monomers are used in the form neutralized with mineral acids or organic acids or in quaternized form, in which case quaternization is preferably effected with dimethyl sulfate, diethyl sulfate, methyl chloride, ethyl chloride or benzyl chloride. In a preferred embodiment, the monomers quaternized with methyl chloride or benzyl chloride are used.

After size reduction, the gel is dried in batches in a circulating-air drying oven at 70°C to 150°C, preferably at 80°C to 120°C and particularly preferably at 90°C to 110°C. In the continuous version, drying takes place in the same temperature ranges, for example on a belt dryer or in a fluidized-bed dryer. After drying, the product preferably has a moisture content of less than or equal to 12%, and particularly preferably of less than or equal to 10%.

After drying, the product is ground to the desired particle-size fraction. In order to achieve rapid dissolution of the product, at least 90 wt% of the product must have a size of smaller than 2.0 mm, and preferably 90 wt% must have a size of smaller than 1.5 mm. Fine fractions smaller than 0.1 mm should amount to less than 10 wt%, preferably less than 5 wt%.

The inventive polymers are suitable as flocculation auxiliaries in the course of solid/liquid separation. In particular, they can be used suitably for purification of wastewater and for conditioning of potable water. Above and beyond this, they can be advantageously used as retention auxiliaries in flocculation processes during paper manufacture.

The invention will be explained hereinafter on the basis of examples.

Examples

Determination of the viscosity of the polymer

The viscosities were determined with a Brookfield viscometer on a 0.5 wt% solution in 10 wt% NaCl solution. The dissolution time was one hour.

The following abbreviations are used: